

Claims

- [c1] 1.A permanent magnet type rotary electric machine having a rotor and a stator, one of said rotor and said stator comprising a plurality of permanent magnets disposed such that polarities of adjacent magnets are different from each other, the other of said rotor and said stator comprising a plurality of electrical coils wound around cores juxtaposed to said permanent magnets for cooperation therewith, said coil windings being arranged in groups having their windings connected to each other with common ends, no two coil windings of each group being circumferentially adjacent to the other.
- [c2] 2.A permanent magnet type rotary electric machine having a rotor and a stator, one of said rotor and said stator comprising a plurality of permanent magnet disposed such that polarities of adjacent magnets are different from each other, the other of said rotor and said stator comprising a plurality of electrical coils wound around cores juxtaposed to said permanent magnets for cooperation therewith, one of said cores and said permanent magnets being disposed in nonsymmetrical relation to the axis of rotation of said stator.
- [c3] 3.A permanent magnet type rotary electric machine as set forth in claim 2, wherein the coil windings are arranged in groups having their windings connected to each other with common ends, no two coil windings of each group being circumferentially adjacent to the other.
- [c4] 4.A permanent magnet type rotary electric machine as set forth in claim 2 wherein all the permanent magnets are of substantially of the same shape a circumferential offset angle of each permanent magnet from a regularly disposed position is set such that a cogging number per rotation of the rotor is equivalent to as the least common multiple of the number S of slots between the electrical winding cores and the number P of magnetic poles.
- [c5] 5. The permanent magnet type rotary electric machine as set forth in claim 2, wherein the magnitude of the torque exerted on each permanent magnet is determined separately by a computer numerical analysis and peaks or bottoms of the torque curves of said permanent magnets are offset from each other with respect to the rotation angle of the rotor so that the cogging number is

increased.

[c6] 6.A permanent magnet type rotary electric machine as set forth in claim 5, wherein the coil windings are arranged in groups having their windings connected to each other with common ends, no two coil windings of each group being circumferentially adjacent to the other.

[c7] 7. The permanent magnet type rotary electric machine as set forth in claim 4, wherein the number S of slots is eighteen, the number P of magnetic poles is twelve, and the twelve permanent magnets are divided into four sets, each set comprising three circumferentially adjacent permanent magnets, the circumferential pitch angle of the three permanent magnets of each set is 26.7° , and the circumferential pitch angle of adjacent two permanent magnets between the sets is 36.60° .

[c8] 8.A permanent magnet type rotary electric machine as set forth in claim 7, wherein the coil windings are arranged in groups having their windings connected to each other with common ends, no two coil windings of each group being circumferentially adjacent to the other.

[c9] 9.The permanent magnet type rotary electric machine as set forth in claim 4, wherein the number S of slots is eighteen, the number P of magnetic poles is twelve, and the twelve permanent magnets are divided into four sets, two of said four sets comprising three circumferentially adjacent permanent magnets, the circumferential pitch angle of the three permanent magnets of each set is 26.7° , and the circumferential pitch angle of permanent magnets within the other two sets disposed at a symmetrical position is 33.3° .

[c10] 10.A permanent magnet type rotary electric machine as set forth in claim 9, wherein the coil windings are arranged in groups having their windings connected to each other with common ends, no two coil windings of each group being circumferentially adjacent to the other.

[c11] 11. The permanent magnet type rotary electric machine as set forth in claim 4, wherein the number S of slots is eighteen, the number P of magnetic poles is twelve, and the twelve permanent magnets are divided into four sets of three

| Country | Year | Population (millions) | Urban population (millions) | Urban population (%) | Population density (per sq km) | Urban population density (per sq km) | Population growth rate (%) | Urban population growth rate (%) | Population growth rate (%) | Urban population growth rate (%) | Population growth rate (%) | Urban population growth rate (%) |
|---------|------|-----------------------|-----------------------------|----------------------|--------------------------------|--------------------------------------|----------------------------|----------------------------------|----------------------------|----------------------------------|----------------------------|----------------------------------|
| Algeria | 1980 | 10.5 | 4.5 | 42.9 | 100 | 222 | 1.8 | 2.5 | 1.8 | 2.5 | 1.8 | 2.5 |
| Algeria | 1985 | 11.5 | 5.5 | 47.8 | 110 | 244 | 2.0 | 2.8 | 2.0 | 2.8 | 2.0 | 2.8 |
| Algeria | 1990 | 12.5 | 6.5 | 52.0 | 120 | 266 | 2.2 | 3.0 | 2.2 | 3.0 | 2.2 | 3.0 |
| Algeria | 1995 | 13.5 | 7.5 | 55.6 | 130 | 288 | 2.4 | 3.2 | 2.4 | 3.2 | 2.4 | 3.2 |
| Algeria | 2000 | 14.5 | 8.5 | 58.6 | 140 | 310 | 2.6 | 3.4 | 2.6 | 3.4 | 2.6 | 3.4 |
| Algeria | 2005 | 15.5 | 9.5 | 61.3 | 150 | 332 | 2.8 | 3.6 | 2.8 | 3.6 | 2.8 | 3.6 |
| Algeria | 2010 | 16.5 | 10.5 | 63.6 | 160 | 354 | 3.0 | 3.8 | 3.0 | 3.8 | 3.0 | 3.8 |
| Algeria | 2015 | 17.5 | 11.5 | 65.7 | 170 | 376 | 3.2 | 4.0 | 3.2 | 4.0 | 3.2 | 4.0 |
| Algeria | 2020 | 18.5 | 12.5 | 67.6 | 180 | 398 | 3.4 | 4.2 | 3.4 | 4.2 | 3.4 | 4.2 |
| Algeria | 2025 | 19.5 | 13.5 | 69.2 | 190 | 420 | 3.6 | 4.4 | 3.6 | 4.4 | 3.6 | 4.4 |
| Algeria | 2030 | 20.5 | 14.5 | 70.7 | 200 | 442 | 3.8 | 4.6 | 3.8 | 4.6 | 3.8 | 4.6 |
| Algeria | 2035 | 21.5 | 15.5 | 72.1 | 210 | 464 | 4.0 | 4.8 | 4.0 | 4.8 | 4.0 | 4.8 |
| Algeria | 2040 | 22.5 | 16.5 | 73.3 | 220 | 486 | 4.2 | 5.0 | 4.2 | 5.0 | 4.2 | 5.0 |
| Algeria | 2045 | 23.5 | 17.5 | 74.5 | 230 | 508 | 4.4 | 5.2 | 4.4 | 5.2 | 4.4 | 5.2 |
| Algeria | 2050 | 24.5 | 18.5 | 75.5 | 240 | 530 | 4.6 | 5.4 | 4.6 | 5.4 | 4.6 | 5.4 |
| Algeria | 2055 | 25.5 | 19.5 | 76.5 | 250 | 552 | 4.8 | 5.6 | 4.8 | 5.6 | 4.8 | 5.6 |
| Algeria | 2060 | 26.5 | 20.5 | 77.4 | 260 | 574 | 5.0 | 5.8 | 5.0 | 5.8 | 5.0 | 5.8 |
| Algeria | 2065 | 27.5 | 21.5 | 78.2 | 270 | 596 | 5.2 | 6.0 | 5.2 | 6.0 | 5.2 | 6.0 |
| Algeria | 2070 | 28.5 | 22.5 | 78.9 | 280 | 618 | 5.4 | 6.2 | 5.4 | 6.2 | 5.4 | 6.2 |
| Algeria | 2075 | 29.5 | 23.5 | 79.7 | 290 | 640 | 5.6 | 6.4 | 5.6 | 6.4 | 5.6 | 6.4 |
| Algeria | 2080 | 30.5 | 24.5 | 80.3 | 300 | 662 | 5.8 | 6.6 | 5.8 | 6.6 | 5.8 | 6.6 |
| Algeria | 2085 | 31.5 | 25.5 | 81.0 | 310 | 684 | 6.0 | 6.8 | 6.0 | 6.8 | 6.0 | 6.8 |
| Algeria | 2090 | 32.5 | 26.5 | 81.6 | 320 | 706 | 6.2 | 7.0 | 6.2 | 7.0 | 6.2 | 7.0 |
| Algeria | 2095 | 33.5 | 27.5 | 82.1 | 330 | 728 | 6.4 | 7.2 | 6.4 | 7.2 | 6.4 | 7.2 |
| Algeria | 2100 | 34.5 | 28.5 | 82.6 | 340 | 750 | 6.6 | 7.4 | 6.6 | 7.4 | 6.6 | 7.4 |
| Algeria | 2105 | 35.5 | 29.5 | 83.1 | 350 | 772 | 6.8 | 7.6 | 6.8 | 7.6 | 6.8 | 7.6 |
| Algeria | 2110 | 36.5 | 30.5 | 83.6 | 360 | 794 | 7.0 | 7.8 | 7.0 | 7.8 | 7.0 | 7.8 |
| Algeria | 2115 | 37.5 | 31.5 | 84.0 | 370 | 816 | 7.2 | 8.0 | 7.2 | 8.0 | 7.2 | 8.0 |
| Algeria | 2120 | 38.5 | 32.5 | 84.4 | 380 | 838 | 7.4 | 8.2 | 7.4 | 8.2 | 7.4 | 8.2 |
| Algeria | 2125 | 39.5 | 33.5 | 84.8 | 390 | 860 | 7.6 | 8.4 | 7.6 | 8.4 | 7.6 | 8.4 |
| Algeria | 2130 | 40.5 | 34.5 | 85.2 | 400 | 882 | 7.8 | 8.6 | 7.8 | 8.6 | | |

[c1 2]